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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/532,516	04/25/2005	John Allen Hilton	P/382-152	8700

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OSTROLENK FABER GERB & SOFFEN
1180 AVENUE OF THE AMERICAS
NEW YORK, NY 100368403

EXAMINER	
KONG, SZE-HON	
ART UNIT	PAPER NUMBER
3661	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/532,516	HILTON, JOHN ALLEN	
	Examiner	Art Unit	
	SZE-HON KONG	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 4/8/2009 have been fully considered but they are not persuasive.

On page 10 of the Applicant's Response, Applicant argues the Paulsen's device is impossible to measure any translational force because no translational movement is possible and the suspensor provides a single degree of constraint and does not measure the force acting along this degree of constraint".

The Examiner respectfully disagrees with the Applicant. Paulsen discloses the suspensors are slender elongate members connected respectively to the platform and its support and may extend radially in any direction. They are compliant in torsion and flexure but are axially stiff (Col. 2, lines 12-29). Also discloses the suspension can be replaced by elements such as wires or tapes (Col. 2, lines 64-65). The suspensors are for the purpose of supporting the platform in a neutral position and are designed to be flexible. Paulsen does not suggest not to measure any translational force, but in fact point out that it is common practice to determine rotational movement or torque developed in response to developed forces and determined direction of movement. Together with this information and information regarding translation forces are used for design work and assist in the study and solution of guidance and control problems (Col. 1, lines 35-55). It is obvious that these suspensors provide translational forces and multiple degree of constraint because they are compliant in torsion and flexure and are

only axially stiff positioning the platform in a neutral position. Such suspensors can be replaced by more flexible elements such as wires or tape, suggested by Paulsen.

On page 10 and 11 of the Applicant's Response, Applicant argues the suspensors can be arranged and intersect a point and be normal to the faces of a tetrahedron suggested by Paulsen is almost an incidental option but does not lead towards the apparatus recited in the present independent claims.

The Examiner respectfully disagrees with the Applicant. Paulsen suggests a number of alternatives and specifically suggests the arrangement of the arms can intersect a point and be normal to the faces of a tetrahedron clearly suggests the same configuration and feature of the present invention as claimed. It would be obvious for one of ordinary skill in the art that the suggested arrangement is the same as the present claimed invention.

On page 11 of the Applicant's Response, Applicant argues it is incorrect that the arms, taught by Paulsen provide 8 degrees of constraint and each of Paulsen's suspensors has a single degree of constraint.

The Examiner respectfully disagrees with the Applicant. As explained above, the suspensors are flexural and are compliant in torsion and can be replaced by elements such as wires or tapes that obviously have higher tension suitable for detecting translational forces in any direction. It would have been obvious that the suspensors provide not only a single degree of constraint but eight degrees of constraint to the system.

On page 11 and 12 of the Applicant's Response, Applicant argues the present independent claims recite a fundamentally different geometry and different mechanism in comparison with the teaching of Paulsen and Paulsen does not have any suggestion of measuring a response in the suspensors to any force or any torque applied to the gripping device and transmits the measurement to the arms and the suspensors are configured to prevent any translational motion.

The Examiner respectfully disagrees with the Applicant. As explained above, Paulsen suggests an alternate embodiment with the exact geometry as the present invention as claimed. Paulsen also discloses when the platform rotates, the forcer acts in response to the signals from the sensors to move the platform back to its neutral position and the current of the forcer is proportional to the force exerted by the forcer and hence to the torque developed on the platform, the gripping device. The signals are fed from indicators to a collator which will produce indications of the total torque and its direction of application (col. 3, line 61 - col. 4, line 9). It is obvious that Paulsen teaches measuring force or torque applied to the platform in response to the suspensors detectors and signals are transmitted for collations. The suspensors allow translational force detection with the above explanation.

Claim Objections

1. Claim 4 is objected to because of the following informalities:

The term “the connection means” (claim 4, lines 3-4) should read “the connection joints”.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The subject matter "a software embedded on a recording medium and including a set of instructions operable to control the computer system" was not disclosed in the specification. Applicant is requested to specifically point out where in the disclosure discloses these limitations.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paulsen et al. (3,490,059), Brannon (5,854,622) and Hilton et al. (5,798,748).

For claims 1-6, 10-14, 17 and 18, Paulsen discloses an apparatus having a symmetrical arrangement of four suspensors, arms arranged to be normal to the faces of a tetrahedron, letting the body be constrained by the arms, the arms define a point of suspension about which the platform, the gripping means are free to rotate, a flexural pivot (col. 3, lines 3-27); the suspensors restrain translational movement of the platform relative to the reaction support and permit limited rotational movement about the suspension point; and an electrical measuring system may be connected to the apparatus to measure torques about three or more axes (Abstract). The suspensors are rather slender elongate member and may extend radially in any direction (col. 2, lines 21-29). Suspension can also be accomplished with elements such as wires or tapes which are stiff in tension only, provided to avoid translations, but to keep the platform supported and at a neutral position (col. 2, lines 51-68). Sensing equipment is provided for each of the axes and acts simultaneously to determine torque about all three axes at the same time and signals are fed from indicators to a collator to produce indications of the total torque and tits direction of application, the response detector and provide output representing force and torque applied (col. 3, line 73 – col. 4, line 3); the arms are in eight degrees of constraint (fig. 2); cylindrical bores are formed to freely receive suspensors, the arm having part-spherical profile is slidable along the bores and the

arms are rotatable relative to the axis of the bore, where the arms is slidable along the bores formed inside the platform 92 and are rotatable (fig. 2 and col. 6, lines 51-60); and the system investigating reaction torque effects under various conditions of operation of aircraft and space vehicle components and determine the amount of rotational movement or torque developed by components in response to maneuvers and forces developed with respect to the force detection (col. 1, lines 35-55). Brannon discloses the input apparatus is connected to a computer through a standard computer port for computer control (Abstract).

Paulsen does not specifically discloses the response detection means has means for directly monitoring response in three and only three of the four arms and the device further comprises means for calculating from data representing the monitored response in the three arms the values of a response in the fourth arm and a software embedded on a recording medium and including a set of instructions operable to control the computer system in response to the output signal from the response detectors and the value calculated by the computer. However, Paulsen discloses detecting torque in all directions when the torque sensing apparatus is used on aircraft and space vehicle for rotational movement or torque development for control purpose (col. 1, lines 35-55). It would have been obvious for a computer system inherently exists in these vehicles, having embedded software in the memory, such as hard drives, capable of sending commands for control in response to the output signal from the detectors. Hilton discloses a force and torque converter having part-spherical profile arms slidable along the bores and the arms are rotatable relative to the axis of the bore, where the arms is

slidable along the bores formed inside the platform 92 and are rotatable (Fig. 2). Brannon discloses a input control system having sensors on three of the arms monitoring the force and torque applied to handle 12, the fourth arm (Fig. 6, col. 5, lines 46-59) and a conventional control apparatus and method using software applications to interact with the system (col. 1, lines 28-44). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the invention of Paulsen to detect translational force using slidable arms along the bores, taught by Hilton and include sensors on three of the four arms in the system to monitor force and torque applied to the fourth arm and control the system in response to the output signal calculated by the detected force and torque applied to the control, taught by Brannon to reduce cost for reducing number of sensors and detect three dimensional force in the system efficiently.

For claims 7, 8, 15 and 16, Hilton discloses optical detectors associates with each arm arranged in the same plane and having respective optical axes transverse to the axis of the associated arm (fig. 2, 3 and col. 13, line 63 – col. 14, line 10). Incorporating a total of 6 optical sensors arranged in three of the four arms is a matter of design choice. Brannon discloses sensors disposed in pairs around three of the four arms (fig. 6). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the invention of Paulsen to include optical detectors associates with each arm, taught by Hilton to accurately monitor the force and torque applied on the arms of the system due to the high sensitivities of such sensor.

For claim 9, Hilton discloses an array of sensors for each of the arms to provide readings to resolve the required output signal (col. 22, lines 5-29). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the invention of Paulsen to include an array of sensors for each of the four arms to provide eight readings, taught by Hilton to accurately resolve the control signal of the input system.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SZE-HON KONG whose telephone number is (571)270-

1503. The examiner can normally be reached on 7:30AM-5PM Mon-Fri, Alt. Fri. Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

5/13/2009

/SZE-HON KONG/
Examiner, Art Unit 3661

/Thomas G. Black/
Supervisory Patent Examiner, Art Unit 3661